November 12, 1978

REGULATION OF PESTICIDE USE AND SAFETY IN CALIFORNIA AS IT INVOLVES USE OF PESTICIDES IN THE TREATMENT OF CATTLE SCABIES DUE TO PSOROPTES OVIS

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Presented to Scabies School
Sponsored by
California Department of Food and Agriculture
Division of Animal Industry
Fresno, California
November 15, 1978

ACF-59-555

The Division of Pest Management, Worker Safety and Environmental Protection of the California Department of Food and Agriculture in conjunction with the county agricultural commissioners have the major responsibility for regulating pesticide use in California. Their regulatory activities supplement federal EPA activities and emphasize environmental and worker safety factors protection.

Although pesticides may be registered by the federal government, they cannot be used in California unless they are also registered in California. Also, they may only be used for the specific use approved in California and then only according to specific regulations.

Several specific proprietary brand pesticides are recommended by the USDA for official use in cooperative programs against scabies; see attachment one.

Lime-sulfur formulations constitute one approved group. These formulations have been used against scabies for many years. They are not environmental hazards. They are not acutely toxic and do not poison animals or applicators. They can be very irritating to the skin and can cause severe eye irritation. Use of protective clothing adequate to reduce skin contact with the pesticide and a face shield to reduce eye contact is desirable. Unfortunately, these products have such low toxicity to mites, sometimes they have to be used three to five times to eradicate an infestation.

Toxaphene, an organochlorine, is the ingredient in another group of approved psoroptic miticides. These are attractive for use because a single application usually kills all mites. However, this chemical is absorbed through the skin and as a result, dipped cattle must be withheld from slaughter for 28 days. This chemical is more toxic systemicly to man than the lime-sulfur preparations but usually protective clothing to protect the skin and the use of face shields to give eye protection gives adequate protection to those persons working with this pesticide. If spraying is being done, respirators are also recommended. Because of the environmental hazard, toxaphene is a restricted material and the user must be a certified applicator. The local agricultural commissioner can provide the permit and certification. There is particular concern that dipping vats and containers will not be dumped where the contents will drain into a stream or that dipped cattle will not be permitted to walk through a stream. These actions can lead to down stream fish kills.

Coumaphos, an organophosphate, is the ingredient in another group of approved miticides. This product must be used about twice to kill all the mites. It is environmentally much safer than toxaphene because of its more rapid decay rate in nature, but it is much more hazardous to use because as a cholinesterase-inhibitor, it can poison and kill treated animals and can easily poison careless applicators. Safe use statements on the labels and California worker safety regulations should be complied with. For example if employees are going to work with this product more than 30 hours in a 30-day period, they must be under medical supervision. The main hazard is the ability of this chemical to pass through the skin; thus skin protection

is quite important. Protective clothing to prevent skin exposure is needed. A face shield will usually protect the face. If spray applications are made, respirators are needed. Thorough cleaning of the skin and changing into clean clothes at the end of the day is particularly important.

Prolate (phosmet) is another organophosphate more recently given federal approval for use as a miticide against scabies; see appendix two. It has most of the same advantages and disadvantages of coumaphos. Worker protection requirements are similar. At the time this paper was being prepared it appeared doubtful if Starbar had amended their California registration to include mites. This product should not be used for mites in California until such registration is certain.

Pesticide labels are all undergoing revisions so that the signal words (DANGER, WARNING, and CAUTION) will have standard meanings and safe use instructions will be more specific. All of the labels of pesticides approved and registered for use in the scabies programs in California are of the old type. The user is required by federal and state law to follow the safe use instructions on the label. Since these have in the past often been vague as to their meaning, a label interpretation guideline has been prepared to assist the use and employer to provide proper protection; see attachment four.

The specific worker safety regulations that apply to use of these pesticides are marked in attachment five of this report. In summary, they require that:

1. The employer require the employee to follow the safe use instructions,

2. The employee is to be instructed in safe work procedures,

3. A place for emergency medical care is to be identified,

4. Medical supervision is to be provided to those workers subject to significant exposure to organophosphates,

5. Clean clothes are to be provided daily,

6. A clothes change area is to be provided,

7. Personal washing facilities are to be provided,

8. Protective clothing is to be provided, and

9. Safety equipment is to be provided.

ATTACHMENT ONE

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WASHINGTON, D.C. 20250

August 17, 1978

VETERINARY SERVICES MEMORANDUM 556.1
Supplement No. 1

Subject: Permitted Pesticides for Official Use in Cooperative Programs for Cattle Fever Ticks, Scabies, and Screwworm Eradication

To: Area Veterinarian in Charge
Veterinary Services

I PURPOSE

This supplement to Veterinary Services Memorandum 556.1 lists each of the proprietary brands of pesticides which have been accepted for official use in cooperative tick, scabies, and screwworm programs. These permitted brands are registered with the appropriate Federal agency and have undergone further evaluation to assure their efficacy when used in cooperative programs.

This supplement cancels Veterinary Services Memorandum 556.1, Supplement No. 1, dated May 9, 1977.

II GENERAL

The pesticides and the concentrations at which they may be used are listed in the Code of Federal Regulations, Part 72.13 for ticks, Parts 73.10 and 74.24 for scabies, and Part 83.8 for screwworms.

III PERMITTED PROPRIETARY BRANDS

A. For use against ticks

1. Coumaphos (Co-Ral) wettable powder

Co-Ral 25 percent wettable powder
Manufacturer: Bayvet
Post Office Box 4913, Hawthorn Road
Kansas City, Missouri 64119

Co-Ral Animal Insecticide (25 percent wettable Powder)
Manufacturer: Ralston Purina Company
Checkerboard Square
St. Louis, Missouri 63188

2. Dioxathion (Delnav) emulsion

Del Tox (DLV6A emulsion only)
Manufacturer: Burroughs-Wellcome
Post Office Box 12338
Research Triangle Park, North Carolina 27703

Delnav-Extra (EF51-5 emulsion only)
Manufacturer: Zoecon Industries
12200 Denton Drive
Dallas, Texas 75231

3. Toxaphene emulsion

Cooper-Tox Livestock
Manufacturer: Burroughs-Wellcome
Post Office Box 12338
Research Triangle Park, North Carolina 27703

Lintox-X (livestock spray and dip)
Manufacturer: Zoecon Industries
12200 Denton Drive
Dallas, Texas 75231

Toxaphene 61 Livestock Spray and Dip
Manufacturer: Lextron, Inc.
Post Office Box BB
Greeley, Colorado 80631

B. For use against scabies

1. Toxaphene emulsion

Registered in California

Cooper-Tox Livestock
Manufacturer: Burroughs-Wellcome
Post Office Box 12338
Research Triangle Park, North Carolina 27703

Lintox-X (livestock spray and dip)
Manufacturer: Zoecon Industries
12200 Denton Drive
Dallas, Texas 75231

Not Registered in California

Toxaphene 61 Livestock Spray and Dip
Manufacturer: Lextron, Inc.
Post Office Box BB
Greeley, Colorado 80631

Not Registered in California

2. Coumaphos (Co-Ral) wettable powder

Co-Ral 25 percent wettable powder
Manufacturer: Bayvet
Post Office Box 4913, Hawthorn Road
Kansas City, Missouri 64119

Not Registered in California

Co-Ral Animal Insecticide (25 percent wettable powder)
Manufacturer: Ralston Purina Company
Checkerboard Square
St. Louis, Missouri 63188

Registered in California

3. Prolate emulsifiable concentrate

Starbar GX 118
Manufacturer: Zoecon Industries
12200 Denton Drive
Dallas, Texas 75231

Registered in California (but not for mites)

4. Lime-sulfur solution (used heated), availability uncertain)

Lacco Liquid Lime Sulphur
Manufacturer: Los Angeles Chemical Company
4545 Ardine Street
South Gate, California 90280

Registered in California

Ortho Lime-Sulfur Solution
Manufacturer: Chevron Chemical Company
Ortho Division
940 Hensley Street
Richmond, California 93804

Registered in California

C. For use against screwworms

1. For use as wound treatment on horses only

Franklin Smear 62; Frankling Kiltect-100 (including bomb)
Manufacturer: Franklin Laboratories, Inc.
1777 South Belair
Denver, Colorado 80222

Martin's U.S. Formula No. 62
Manufacturer: C. J. Martin & Sons, Inc.
606 West Main Street
Nacogdoches, Texas 75961

2. For use as a wound treatment on any livestock

TPC Livestock Smear
Manufacturer: Texas Phenothiazine Company
2021 North Grove
Fort Worth, Texas 76106

Martin's Korlan Smear Insecticide
Manufacturer: C. J. Martin & Sons, Inc.
606 West Main Street
Nacogdoches, Texas 75961

Co-Ral (coumaphos) 5 percent Livestock Duster
Co-Ral (coumaphos) 3 percent Pressurized Spray-Foam Wound Treatment
Manufacturer: Bayvet
Post Office Box 4913, Hawthorn Road
Kansas City, Missouri 64119

Smear K (contains Korlan)
Manufacturer: Burroughs-Wellcome
Post Office Box 12338
Research Triangle Park, North Carolina 27703

3. For use as a spray and/or dip on any livestock

Co-Ral (coumaphos) Animal Insecticide 25 percent wettable Powder used as 0.20-0.25 percent spray or wound treatment
Co-Ral (coumaphos) Emulsifiable Livestock Insecticide used as a 0.20-0.25 percent spray or wound treatment
Manufacturer: Bayvet
Post Office Box 4913, Hawthorn Road
Kansas City, Missouri 64119

Dow Korlan 24E Insecticide used as 0.45-0.5 percent spray
or wound treatment
Manufacturer: Dow Chemical Company
Post Office Box 1706
Midland, Michigan 48640

J. K. Atwell
Acting Deputy Administrator
Veterinary Services

ATTACHMENT TWO

Evaluation of Phosmet for the Control of the Common Scabies Mite on Cattle

Irwin H. Roberts, DVM; Grant I. Wilson, PhD; William P. Meleney, DVM

SUMMARY

Thirty-four young range cattle heavily infested with the common scabies mite, *Psoroptes ovis*, were dipped in phosmet (*O,O*-dimethyl phosphorodithioate *S*-ester with *N*-(mercaptomethyl)phthalimide) in 15 trials. All concentrations from 0.15% to 0.25% that were applied once failed in at least one trial, but all concentrations from 0.075% to 0.20% were successful in eradicating mites when used twice at 7- to 10-day intervals. One single dip tried at 0.30% also was successful. Uninfested yearlings were dipped in 0.30% phosmet without apparent intoxication, but 2-year-old cattle treated in a spray-dip machine at 0.40% active ingredient became depressed and stiff gaited.

CATTLE SCABIES, which is caused by *Psoroptes ovis*, continues to plague ranchers and feedlot operators in the central and southwestern states, despite federal and state quarantine and treatment programs. Yet, eradication of cattle scabies from the United States appears to be only a matter of time if quarantine and dipping measures are strictly observed and if more effective psoropticides become available. Lindane, although it is still in use in many areas of the world, has not been approved for use on livestock in the United States since 1969. Toxaphene, like lindane, will eliminate scabies mites with a single application, but tissue residues persist so that treated cattle must be withheld from slaughter for 28 days. Lime-sulfur application remains acceptable from the environmental and safety standpoints but has several shortcomings as far as control is concerned, including the need to treat each animal 3 to 5 times to assure elimination of all mites.

The search for effective and acceptable replacement acaricides has led to the testing of a wide variety of compounds and formulations, with the result that coumaphos (*O,O*-diethyl *O*-(3-chloro-4-methyl-2-oxo-2*H*-1-benzopyran-7-yl) phosphorothioate)[a] was given Environmental Protection Agency and USDA certification in 1974 and phosmet (*O,O*-dimethyl phosphorodithioate *S*-ester with *N*-(mercaptomethyl)phthalimide)[b] was certified by the same agencies in 1975. Coumaphos is effective against many arthropod pests of livestock but requires 2 applications 10 to 14 days apart to eliminate infestations of psoroptic mites. Its use permits shipping of cattle to slaughter immediately after treatment, a distinct advantage to feedlot operators. Phosmet also is effective against many arthropod pests.[1-8] Like coumaphos, phosmet must be applied to cattle twice to control scabies. Some of the experimental data that contributed to the approval of phosmet by the USDA and the limitations associated with its field use are the subject of this report.

Materials and Methods

The work described here was performed at the Animal Parasite Research Laboratory, Agricultural Research Service, USDA, Albuquerque, NM. The cattle used in the tests conducted during 1973 and 1974 were 18 grade Hereford or Hereford-Angus calves, 8 to 12 months of age, weighing between 115 and 205 kg, and purchased from scabies-free herds in New Mexico; 13 calves of approximately the same breeding, age, weight, and raised on the laboratory premises; and three 2- or 3-year-old cattle, weighing between 210 and 300 kg, purchased in prior years, and maintained at the laboratory for experimental purposes. To ensure adequate numbers of infested subjects, we mechanically infested newly acquired calves with *P ovis* mites taken from heavily parasitized donor cattle. Scabs and hair containing several hundred mites were scraped from the donor animals and transferred to the top line, from the withers to the middle of the thorax, of each recipient. The hair of the animals, which was long at the time, was gathered up around the transplanted scabs and tied or taped into an upright tuft to prevent their loss.

From the Parasite Research Laboratory, Agricultural Research Service, US Department of Agriculture, Albuquerque, NM 87103. Dr. Roberts is retired, Dr. Wilson's present address is Bioptics Corp, 1405 W 820 North, Provo, UT 84601, and Dr. Meleney's present address is US Livestock Insects Laboratory, Science and Education Administration, US Department of Agriculture, PO Box 232, Kerrville, TX 78028.

Address reprint requests to Dr. Meleney, US Livestock Insects Laboratory, Science and Education Administration, US Department of Agriculture, PO Box 232, Kerrville, TX 78028.

[a] Co-Ral, Bayvet Corp, Shawnee Mission, Kan.

[b] Prolate (GX-118) or Imidan, Thuron Industries, Inc, Dallas, Tex.

TABLE 1—Efficacy of Single and Double Treatments with Different Concentrations of Phosmet Against *Psoroptes ovis*—Results of Observations for 45 to 60 Posttreatment Days

		First treatment				Second treatment				
		Dip vat analyses					Dip vat analyses			
No. of cattle treated	Calculated concentration (% AI)	Predip (% AI)	Postdip (% AI)	Postdip pH	Results	Days after first dipping	Predip (% AI)	Postdip (% AI)	Postdip pH	Results
2	0.15*	0.139	0.146	5.5	Effective	....	.....	.....	....	.....
2	0.15*	0.082	0.082	6.1	Ineffective	....	.....	.....	....	.....
2	0.30*	0.261	.....	5.6	Effective	....	.....	.....	....	.....
2	0.15†	.....	0.151	4.6	Ineffective	....	.....	.....	....	.....
2	0.15‡	0.122	0.144	5.4	Ineffective	....	.....	.....	....	.....
2	0.15‡	0.082	0.082	5.7	Ineffective	....	.....	.....	....	.....
2	0.20	0.192	0.190	6.6	Ineffective	....	.....	.....	....	.....
2	0.20	0.191	0.189	6.9	Ineffective	....	.....	.....	....	.....
2	0.25	0.265	0.246	6.5	Effective	....	.....	.....	....	.....
2	0.25	0.239	0.250	6.5	Ineffective	....	.....	.....	....	.....
4	0.075*	0.062	0.066	5.7	Ineffective	9	0.063	0.064	5.8	Effective
2	0.15*	0.139	0.146	5.5	Effective	10	0.140	0.139	5.5	Effective
3	0.15	0.130	0.120	6.3	Ineffective	9	0.120	0.120	6.6	Effective
3	0.20	0.170	0.160	6.4	Ineffective	9	0.170	0.170	6.4	Effective
2	0.20	0.149	0.151	6.3	Effective	7	0.131	0.129	6.2	Effective

* One kg triple super phosphate (TSP) added/500 L of dip. † One kg TSP added/275 L of dip. ‡ One kg TSP added/400 L of dip.
AI = Active ingredient.

When the infestations had become well established, the cattle were examined to determine the extent of the infestation and were assigned to groups for treatment. Skin scrapings from animals infested heavily enough to be included in a dipping trial did not have to be evaluated; numerous mites could be found in situ. Two herds of heavily infested, untreated cattle, one consisting of calves and yearlings of both sexes and the other of older cattle of mixed sexes and ages, were maintained on the laboratory premises at all times. Members of these scabies-infested herds served as untreated "controls."

After adding a predetermined amount of emulsifiable concentrate (EC) to the water in the vat, we vigorously agitated the emulsion by hand, using a specially designed plunger. Thereafter, an air-jet system continued the agitation while the dipping was in progress. Since phosmet is effective only in a slightly acidic emulsion, 1 kg of triple super phosphate (TSP; commercially available "0–43–0" containing 43% "soluble phosphate" as P_2O_5) was added to 500 L of vat contents in 5 of the 1973 to 1974 tests, to give a pH ranging from 5.5 to 6.1. In 1 trial, TSP added at the rate of 1 kg/275 L of dip produced a pH of 4.6, and in 2 trials, 1 kg/400 L of dip produced pH readings of 5.4 and 5.7. During the 2nd year (Oct, Nov, and Dec 1974), TSP was not added, inasmuch as its contribution to toxicant stability had been demonstrated in the first 6 trials; however, freshly made dip was used for each application, so that initial pH readings ranged from 6.3 to 6.9 and final readings ranged from 5.5 to 6.6 (Table 1). Samples of the vat contents were collected before dipping and immediately after the last animal was dipped. The samples were sent in glass containers to the formulator's analytic laboratory to confirm the calculated concentration of active ingredient (AI) in the vat.

A total of 34 infested cattle were treated with phosmet in 15 trials at concentrations from 0.075% to 0.30% AI, prepared from a commercially available EC[b] containing 1 kg of AI/8.3 L (1 lb/gal). The cattle were dipped into a 1.3- by 2.4- by 2-m steel vat containing between 1,800 and 2,400 L of the appropriate aqueous emulsion while they were confined in a steel mesh cage. The cage was mechanically lowered into the vat until the animal's head and body were completely submerged for 2 to 4 seconds. It was then raised enough to permit the animal to breathe, leaving the remainder of the body below the surface. After approximately 30 seconds, the animal was again submerged, then raised slightly. After a total of 1 minute in the vat, the animal was again submerged, the cage was raised to ground level, and excess emulsion was allowed to drain back into the vat before the animal was released into a 7.3- by 7.3-m holding pen. Twenty of the cattle in 10 trials were given only a single treatment; 14 others in 5 trials were treated a 2nd time after 7, 9, or 10 days. After treatment, the cattle were maintained in the holding pens for a minimum of 45 days. During this time, they were periodically restrained in a squeeze chute for examination. Any animal that appeared to be irritated was minutely examined for mites. If live mites were detected on any animal in a treated group, the test was deemed a failure, and the entire group was returned to 1 of the 2 infested herds. A test might thereby be recorded as a failure even though a high order of control had been achieved.

Two tests were conducted with 4 lightly infested or uninfested cattle to assess the toxicity of phosmet to 2-year-old cattle unstressed by scabies. Two were dipped once in 0.30% material in the cage vat, and the other 2 were treated once for 40 to 60 seconds, using a concentration of 0.40% in a walk-through, return-flow box sprayer.[c]

Results and Discussion

Phosmet did not consistently eradicate mite infestations in a single dipping at the concentrations used (Table 1). At least 1 single treatment trial at 0.15%, 0.20%, and 0.25% failed to eliminate mites, but other single treatment trials at 0.15%, 0.25%, and 0.30% were successful. Although the concentration of the dip might have been increased to achieve single-dip eradication, signs suggestive of toxicosis were observed at 0.25%, so stronger single-dip treatments were rejected in favor of double treatments at lower concentrations. One double-dip trial at 0.15% and 1 of the 2 double-dip trials, using 0.20% material, were apparently successful in eliminating the infestation before the 2nd

[c] The Original Spray-Dip Machine, Adrian J. Paul Co, Inc, Duncan, Okla.

dipping, inasmuch as live mites could not be found, but 6 to 7 weeks are required to establish 100% mite eradication. All 5 double-dip trials completely eliminated the mite infestations. It therefore appears that 2 treatments with phosmet at 0.20% are sufficient to eradicate scabies mites.

The 2 infested cattle dipped in the cage vat containing 0.30% material as part of the evaluation of phosmet against scabies (Table 1) or the 2 uninfested cattle dipped in the same concentration of material to assess the effects of phosmet on cattle unstressed by scabies had no signs of toxicosis. The 2 uninfested 2-year-old cattle (ie, unstressed by scabies) sprayed at 0.40% AI were both depressed (head held low, ears drooped), salivated excessively, and walked with stiffness of the hindquarters, but they recovered completely within 2 hours. Signs of toxicosis have been reported in stressed cattle dipped in vats containing 4- to 10-week-old 0.25% phosmet.[9] Perhaps more of the acaricide is inhaled or swallowed when administered as a spray than when animals are dipped, although this possibility has not been investigated. Symptoms of toxicity were noticed in other tests in which phosmet was administered as 0.25% fresh dips and as 0.25% to 0.50% sprays.[7,9] Our observations suggest that care should be taken not to exceed the recommended concentrations.

Because the well water at the Albuquerque Parasite Research Laboratory is high in carbonates, it is difficult to maintain the calculated concentration of phosmet in the dipping vat. This difficulty was largely overcome by the addition of TSP in amounts recommended by the manufacturer in those instances when the vat contents were retained for subsequent trials (Table 1). However, dipping and spraying operators should be careful to compensate for this factor in the field, especially when hard water is used as a diluent. To minimize this problem, the manufacturers of phosmet have recently developed a vat-side test to determine the concentration of AI in the dip. If this test proves to be reliable, it will eliminate some of the uncertainties involved in the use of phosmet as an acaricide and will provide some assurance that all animals dipped are given adequate treatment.

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Cooper-Tox® Livestock

Emulsifiable Toxaphene Concentrate
Specifically Prepared for Livestock Use
Kills Ticks, Lice, Horn Flies, Keds on Cattle, Sheep and Goats, Hogs and Cures Sheep Scab
Protects Against Reinfestation
One Gallon Makes 150 Gallons of Spray or Dip

PERMITTED FOR USE IN OFFICIAL DIPPING

Active Ingredients

Toxaphene (Technical Chlorinated Camphene—Chlorine Content 67-69%)	61.00%
Xylene	6.75%
Kerosene	19.05%
Inert Ingredients	13.20%
	100.00%

X | **WARNING:** Keep out of reach of children. See other warnings on back panel.

Net Contents One Gallon (U.S. Measure) EPA Reg. No. 59-28-AA Case J 11860

Tox. Cat. Two

COOPER

Cooper Tox Livestock

DIRECTIONS FOR USE ON LIVESTOCK

Beef Cattle

Ticks, Horn Flies and Lice—Accurately mix Cooper-Tox Livestock at the rate of 1 gallon to 150 gallons of water. This concentration will kill ticks and horn flies present and will give up to two and four weeks protection *respectively against reinfestation*. For lice, a single, thorough application is usually sufficient for control. Thorough wetting of animals is important for best results. Repeat application when necessary.

Scabies (Psoroptic, Chorioptic, Sarcoptic)—Mix Cooper-Tox Livestock at the rate of 1 gallon to 150 gallons of water. Thorough wetting is essential for best results. Repeat application in 14 days.

Back Rubbers—To aid in controlling horn flies and lice on beef cattle, dilute 1 part Cooper-Tox Livestock with 15 gallons Diesel fuel or light motor oil. Charge burlap roll by soaking with solution so it is thoroughly wet, but not to the point of dripping. Repeat charging as necessary. Regular exposure of the animals for about 10 weeks is usually necessary for good results *against lice*.

Sheep and Goats

Lice and Sheep Ticks (Keds)—Accurately mix Cooper-Tox Livestock at the rate of 1 gallon to 700 gallons of water. Thorough wetting is essential for best results. One application is usually sufficient for control of these pests.

Sheep Scab—Accurately mix Cooper-Tox Livestock at the rate of 1 gallon to 150 gallons of water. Immerse *sheep for not less than ½ minute*, ducking head at least twice. One dipping is usually sufficient for treating sheep scab. A second dipping may be given in two weeks if needed.

Fleece Worms and Ticks—Accurately mix Cooper-Tox Livestock at the rate of 1 gallon to 150 gallons of water. Wet sheep thoroughly. Repeat application as necessary but not more often than once every two weeks.

Hogs

Lice—Mix Cooper-Tox Livestock at the rate of 1 gallon to 350 gallons of water. A single thorough application is usually all that is necessary for control of this pest. Do not treat sows within two weeks of farrowing nor for three weeks thereafter.

Sarcoptic Mange—Mix Cooper-Tox Livestock at the rate of 1 gallon to 150 gallons of water. Repeat application in 14 days. Thorough wetting is essential.

Mixing Cooper-Tox Livestock With Water—Add Cooper-Tox Livestock directly to required amount of water in accordance with dilutions recommended on this label. Stir or agitate the resulting mixture thoroughly before each use.

Replenishment (Dipping Vats)—Add Cooper-Tox Livestock in accordance with recommended dilutions for all fresh water added to the vat, or control replenishments by vatside test.

WARNING

Do not use Cooper-Tox Livestock on dairy animals, in dairy barns or on feed or forage to be fed to dairy animals. Do not apply to livestock within 28 days of slaughter. Avoid treating animals during cold, *stormy weather. Do not use on dogs.*

Do not spray or dip calves under 3 months of age. If it is necessary to treat calves under the age of 6 months, *spraying is recommended*. In quarantine programs when animals of all ages must be dipped under supervision of Federal and State Personnel for lone star tick or scabies control, individual head immersion of young animals is essential to avoid swallowing of dip wash.

May be fatal if swallowed. Cooper-Tox Livestock is toxic and is absorbed through skin in dry form and from solutions. Avoid inhaling spray mist and getting in eyes. Use respirator or goggles for protection if necessary. Avoid skin contact. Keep away from *food and food products. Keep clothing free from residue.*
DO NOT USE, POUR, SPILL OR STORE NEAR HEAT OR OPEN FLAME.

Use strictly in accordance with label directions *and limitations. Do not use in any manner other than specified* on this label. Do not reuse container. Destroy when empty.

This product is toxic to fish and wildlife. Keep out of any body of water. Do not contaminate water by cleaning of equipment or disposal of wastes.

Antidote

Human—Internal: Call a doctor immediately. Give one tablespoon of salt in a glass of warm water. *Repeat until vomit is clear.* External: Wash with plenty of soap and water.

COOPER DIVISION
Burroughs Wellcome Co.
Research Triangle Park, N.C. 27709

EPA Est. 59-NC-1
J 11850

10 Copy changed throughout--copy code 7512 K.

STATE OF CALIFORNIA
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AGRICULTURAL CHEMICALS AND FEED
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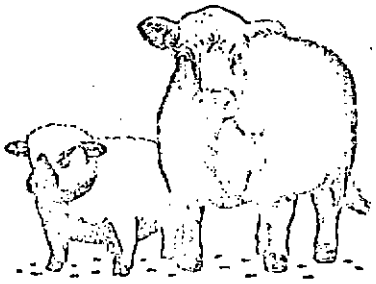
EPA Reg. No. 11556-21-602-AA

Co-Ral™*



ANIMAL INSECTICIDE

25% Wettable Powder

FOR CONTROL OF
SPECIFIED ANIMAL PARASITES

Guarantee

ACTIVE INGREDIENT:	
O,O-Diethyl O-(3-chloro-4-methyl-2-oxo-(2H)-1-benzopyran-7-yl) phosphorothioate	25.0%
Related Organic Phosphates	1.3%
INERT INGREDIENTS:	73.7%
	100.0%

*Co-Ral is a Reg. TM of the Parent Company of Farbenfabriken Bayer GmbH, Leverkusen.

X Tox. Cat. Two

WARNING: KEEP OUT OF REACH OF CHILDREN
STORE IN A COOL PLACE
SEE SIDE PANEL FOR WARNING STATEMENTS

USE ONLY AS DIRECTED

NET WEIGHT: 4 LBS.

DISTRIBUTED BY
RALSTON PURINA COMPANY
GENERAL OFFICES, CHECKERBOARD SQUARE
ST. LOUIS, MISSOURI 63188

DIRECTIONS FOR USE

CO-RAL 25% Wettable Powder mixes easily with water to form a suspension which is readily usable in spray equipment. Maintain an adequate agitation in spray tank to insure uniform suspension during use.

TIMING OF APPLICATIONS FOR CATTLE GRUB CONTROL: Proper timing of treatment is important. For most effective results, cattle should be treated as soon as possible after heelfly activity ceases. Host parasite reactions such as bloat, salivation, staggering and paralysis, may sometimes occur when cattle are treated while the common cattle grub (*Hypoderma lineatum*) is in the gullet, or while the northern cattle grub (*H. bovis*) is in the area of the spinal cord. Cattle should be treated either *before* or *after* these stages of grub development. Consult your veterinarian, extension livestock specialist, or extension entomologist regarding the timing of treatment.

NOTE: If it is impossible to determine the origin of the cattle, and thus the exact stage of the grubs is unknown, it is recommended that the cattle receive only a maintenance ration of low energy feed during the treatment period. This lessens the likelihood of severe bloat which may occur in cattle on full feed when the common grub is killed while in the gullet.

For the most effective reduction of carcass damage and trim loss in cattle to be slaughtered, treatment should be applied at least 6 weeks before the expected appearance of grubs in the back.

NOTICE TO VETERINARIAN: If the proper dosage of CO-RAL 25% Wettable Powder has been applied and adverse reactions, such as bloat, excessive salivation, and posterior paralysis occur, it is highly probable that a host parasite reaction exists. Administer symptomatic treatment. Anti-inflammatory agents may be helpful. If necessary, relieve bloat by trocarization, as a stomach tube may traumatize a severely swollen esophagus. Do not administer atropine, as it is contraindicated in host parasite reactions. If toxicity should occur as a result of gross overdosage, atropine is antidotal.

SPRAY TREATMENT FOR CATTLE GRUB CONTROL: Spray treatment(s) should be applied in such a manner that the skin, not just the hair, becomes thoroughly wet. Spray pressures of 250 to 350 pounds per square inch are recommended. Operate box-type spray chutes at maximum pressure for thorough overall wetting and penetration.

SPRAY TREATMENT FOR ECTOPARASITES LISTED BELOW, EXCEPT CATTLE GRUBS. CO-RAL provides residual control of ectoparasites on livestock and poultry. Repeat applications will be necessary only when insects reappear and constitute a problem.

DIP TREATMENT FOR GRUBS, SCABIES, LICE, HORN FLIES, TICKS, KEDS, FLEECEWORMS: Charge dip vats with accurate concentration by using exact quantity of CO-RAL and volume of water specified. Mix suspension thoroughly before each use. Passage of animals through the vat does not change strength of remaining suspension. Merely replace evaporation with water or add appropriate amount of CO-RAL for rainfall or added water. Continue to use vat until accumulation of debris makes it unsuitable for further use. NOTE: Be sure free access to drinking water is available to animals prior to dipping. Do not dip excessively thirsty animals.

RECOMMENDED APPLICATIONS

DO NOT APPLY MORE THAN 16 POUNDS OF CO-RAL 25% WETTABLE POWDER PER 100 GALLONS OF WATER AS A SPRAY, OR MORE THAN 10 POUNDS OF CO-RAL 25% WETTABLE POWDER PER 100 GALLONS OF WATER AS A DIP. DO NOT APPLY MORE THAN 1 POUND CO-RAL 25% WETTABLE POWDER PER 100 GALLONS OF WATER AS A SPRAY TO LACTATING DAIRY CATTLE.

ANIMAL	PARASITE	POUNDS CO-RAL 25%	REMARKS
Beef and Non-Lactating Dairy Cattle	Grubs	12 to 16	**SPRAY TREATMENT:** Apply specified dosage in 100 gallons of water as a high pressure spray so as to wet the skin, not just the hair, of the animal. Use the higher recommended rate in northern areas or for late fall applications when long hair coats make thorough wetting of the skin difficult. See Directions for Use for proper timing of application.
	Grubs Screwworms*	8	**SPRAY TREATMENT(s):** Apply specified dosage in 100 gallons of water as a high pressure spray so as to wet the skin, not just the hair, of the animal. Repeat as necessary. For grub control, 2 applications per season are required. The applications must not be more than 3 months apart. The second application should be soon after horn fly activity has ceased.
	Grubs	8	**DIP TREATMENT:** Mix specified dosage per 100 gallons of water. Agitate dip suspension thoroughly prior to each use to assure uniform treatment. See Directions for Use for proper timing of application.
	Scabies* (Psoroptes bovis)	10	**DIP TREATMENT:** Mix specified dosage in 100 gallons of water. Agitate dip suspension thoroughly prior to each use. Two treatments, 10 to 14 days apart, are necessary to control scabies. Submerge each animal to assure complete coverage and thorough wetting of the skin.
	Horn flies Lice	2	**SPRAY OR DIP TREATMENT:** Apply specified dosage in 100 gallons of water for complete wetting to run-off. Agitate dip suspension thoroughly prior to each use to assure uniform treatment. Repeat as necessary.
	Ticks	4	
	Ticks*	4 to 8	**DIP TREATMENT:** Mix specified dosage in 100 gallons of water. Agitate dip suspension thoroughly prior to each use to assure uniform treatment.
Beef and Lactating Dairy Cattle	Lice	1	**SPRAY TREATMENT:** Apply specified dosage in 100 gallons of water for a complete wetting to run-off. Repeat as necessary.
Goats Sheep	Horn flies Lice	2	**SPRAY OR DIP TREATMENT:** Apply specified dosage in 100 gallons of water for complete wetting. Treat thoroughly all wounds and injuries. Repeat as necessary but not within 15 days of slaughter.
	Fleeceworms Keds Ticks	4	
	Screwworms*	8	
Sheep	Scabies* (Psoroptes ovis)	8	**DIP TREATMENT:** Mix specified dosage in 100 gallons of water. Agitate dip suspension thoroughly prior to each use. Two treatments, 10 to 14 days apart, are necessary to control scabies. Submerge each animal to assure complete coverage and thorough wetting of the skin. Do not treat within 15 days of slaughter.
Horses Swine	Horn flies Lice	2	**SPRAY TREATMENT:** Apply specified dosage in 100 gallons of water for complete wetting to run-off. Thoroughly treat all wounds and injuries. Repeat as necessary.
	Ticks	4	
	Screwworms*	8	
Poultry (Chickens, Ducks, Geese & Turkeys)	Northern fowl mite	(3 ozs.)	**DIRECT APPLICATION:** Apply specified dosage (1 or 2 cupfuls) in 5 gallons of water as a low pressure spray using approximately 1 gallon per 100 to 125 birds. Individual birds may be treated with about ½ ounce of the spray. Supplementary control can be obtained by treatment of litter and housing. Repeat as necessary but not more often than weekly.
	Lice	(6 ozs.)	
	Flies Lice Northern fowl mite Poultry red mite	(6 ozs.)	**LITTER AND HOUSING TREATMENT:** Apply specified dosage (2 cupfuls) in 5 gallons of water for thorough coverage of litter, walls, ceilings, floors, roosts, nests and adjacent areas. Force spray into all cracks and crevices using approximately 1 gallon per 1000 square feet of area. Repeat as necessary.

*Approved as a "Permitted Pesticide" by Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture for the control of Screwworms, Scabies and Ticks in Federal Eradication Programs when used according to the directions of APHIS Veterinary Service Regulations and/or Memoranda.

RESTRICTIONS

Do not apply as a spray to lactating dairy cattle at rates above 1 lb. of CO-RAL 25% Wettable Powder per 100 gallons of water. Do not treat lactating dairy goats.

Do not treat non-lactating dairy cattle at rates above 1 lb. of CO-RAL 25% Wettable Powder per 100 gallons of water within 14 days of freshening. If freshening should occur within 14 days after treatment at higher rates, do not use milk as human food for the balance of the 14-day interval.

Do not treat non-lactating dairy goats within 14 days of freshening. If freshening should occur within 14 days of treatment, do not use milk as human food for the balance of the 14 day interval.

Do not apply to sick, convalescent, or stressed livestock; or to animals less than 3 months old except in Federal or State eradication programs (Screwworms, Scabies, Cattle Fever Ticks) where immediate treatment of all animals in an infested herd is mandatory.

Do not treat animals for 10 days before or after shipping or weaning, or after exposure to contagious and infectious diseases except in Federal or State eradication programs (Screwworms, Scabies, Cattle Fever Ticks) where immediate treatment of all animals in an infested herd is mandatory.

Do not dip animals when over-heated.

Do not spray poultry within 10 days of vaccination or other stress influences.

Do not spray in a confined, non-ventilated area.

Do not apply in conjunction with oral drenches or other internal medications, such as phenothiazine.

CO-RAL is a cholinesterase inhibitor. Do not use this product on animals simultaneously or within a few days before or after treatment with or exposure to cholinesterase inhibiting drugs, pesticides or chemicals. Atropine is antidotal. Consult veterinarian at first sign of adverse reaction.

WARNING

[illegible] poisonous if swallowed. Harmful if inhaled or absorbed through the skin. Do not get in eyes or on skin. Do not breathe [illegible] spray mist. Wash thoroughly with soap and warm water after handling. Wash contaminated clothing with soap and hot water before reuse.

[illegible] contaminate feed or food. Keep out of reach of children. If poisoning occurs, obtain prompt medical aid. Prolonged exposure will result in cholinesterase depression.

TO PHYSICIAN — Atropine sulfate is antidotal. 2-PAM is also antidotal and may be administered in conjunction with atropine.

PROTECT WILDLIFE — This product is toxic to fish, birds and other wildlife. Keep out of lakes, streams or ponds. Do not contaminate water by cleaning of equipment or disposal of wastes. Apply this product only as specified on this label.

CONTAINER DISPOSAL — Do not re-use empty container. Destroy it by burying with waste or burning. Stay away from smoke or fumes.

7512 K E.P.A. Est. No. 3125-MO-1 Printed in U.S.A.

starbar®

GX-118™

(Prolate*)

Emulsifiable Liquid

spray · dip vat · pour on

a beef cattle insecticide for the control of

grubs, lice, hornflies, cattle ticks & southern cattle ticks

ACTIVE INGREDIENTS: *N*-(Mercaptomethyl) phthalimide *S*-(O, O-Dimethyl phosphorodithioate)	11.60%
Petroleum Hydrocarbon solvent	72.90%
INERT INGREDIENTS:	15.50%
	100.00%

contains one pound active ingredient per gallon

READ ALL DIRECTIONS BEFORE USING

Protect from temperatures below 20°F.

WARNING: KEEP OUT OF REACH OF CHILDREN

May be harmful if swallowed, inhaled, or absorbed through the skin. Do not get in eyes, on skin or on clothing. Do not breathe spray mist. Wear rubber gloves, goggles and protective clothing. In case of skin contact, wash immediately with soap and water; for eyes, flush with water. Wash all contaminated clothing with soap and hot water before re-use. Do not store near heat or open flame. **See left panel for Note to Physician and Veterinarian.**

EPA Reg. No. 476-2043-AA-11787

CONTENTS: 1 GALLON

Note to physician & veterinarian: GX-118 is an organophosphorous insecticide. Atropine is antidotal. Usual symptoms of organophosphorous poisoning in man include: headache, blurred vision, weakness, nausea, discomfort in the chest, vomiting, abdominal cramps, diarrhea, salivation, sweating, pinpoint pupils. Usual symptoms of organophosphorous poisoning in animals include salivation and labored breathing.

Directions for use:

Do not apply within 21 days of slaughter.

Methods of application

To control:	Method to use:
Grubs	Dip, Pour-on, or Spray
Lice	Dip, Pour-on, or Spray
Hornflies	Spray
Cattle Ticks	Dip or Spray
Southern Cattle Ticks	Dip or Spray

Dip vat procedure: Prior to charging vat, empty out old contents and thoroughly clean the vat. Add water to the vat. Add GX-118 at a rate of 1 gallon to each 60 gallons water.

Important: Add triple super phosphate at a rate of 100 pounds per 1000 gallons of vat solution. Super phosphate is added to control the pH of the solution and insure vat stability. Super phosphate is usually available at most fertilizer dealers as 0-45-0 or 0-46-0.

Stir the vat thoroughly, preferably with a compressed air device; however, any form of thorough mixing is adequate since GX-118 emulsifies readily.

Restir vat contents prior to each use.

Replenishment: During the dipping operation, each time the vat's volume is reduced by ¼ of its initial volume, replenish the vat as follows:

Replenish vat with water and add GX-118 at a rate of 1 gallon for each 50 gallons water added.

Important: Also add super phosphate at a rate of 10 pounds per 100 gallons of additional solution.

Stir well and resume dipping. Repeat replenishment process as necessary. For evaporation add additional water accordingly. For added water due to rainfall, merely replenish vat with GX-118 according to label directions.

Vat should be emptied, cleaned and recharged each time one of the following occurs:

1. When the vat has been charged for 60 days.
2. When the dip becomes too foul for satisfactory use, within the 60 day limit.
3. If the number of animals dipped equals the number of gallons of the initial bath volume, within the 60 day limit.

Spray method: To prepare the spray, mix one gallon of GX-118 with 49 gallons of water and stir thoroughly. Apply the fresh mixture as a high-pressure spray, taking care to wet the skin, not just the hair. Apply to the point of "run-off," about one gallon of diluted spray per adult animal. Lesser amounts will permit run-off for younger animals.

Pour-on method: Dilute one part of GX-118 with two parts of water by slowly adding the water to the product while stirring. One gallon of GX-118 makes 3 gallons of pour-on solution. Apply one ounce of the diluted mixture per 100 pounds of body weight (to a maximum of 8 ounces per head) down the center line of the back.

Timing of applications for cattle grub control: For the optimum cattle grub control, it is important to treat as soon as possible after the heel fly season, before the grub larvae reach the gullet or spinal canal as the rapid kill of large numbers of larvae in these tissues may cause toxic side effects such as bloat, salivation, staggering and paralysis. Consult your veterinarian, extension livestock specialist, or extension entomologist regarding timing of treatment.

Warnings:

1. GX-118 is.a cholinesterase inhibitor. Do not use this product on animals simultaneously or within a few days before or after treatment with or exposure to cholinesterase inhibiting drugs, pesticides or chemicals. Atropine is antidotal. Consult veterinarian at first sign of adverse reaction.
2. Do not apply within 21 days of slaughter.
3. For use on beef cattle only.
4. Do not treat sick, convalescent, or stressed cattle or calves less than 3 months old except in Federal or State eradication programs where immediate treatment of all animals in an infested herd is mandatory. Hand dipping of young animals will prevent swallowing of dip solution.
5. Be sure free access to drinking water is available to cattle prior to dipping. Do not dip excessively thirsty animals. Do not dip animals when overheated.

DRUG LOT NO. _____

ACCEPTABLE

EXPIRATION DATE _____

TAKE TIME OBSERVE LABEL DIRECTIONS

6. **Important:** Repeat treatment as necessary but not more often than every 7 days to 10 days. Treatment fo lice, ticks and hornflies may be made any time of the year except when cat grub larvae are in the gullet or spina canal. Treatment for lice and ticks m be made any time 7-10 days followin treatment for grubs. Do not treat gru when the grub larvae are in the gullet spinal canal.
7. Do not contaminate feed or foodstuff This product is toxic to fish. Keep out lakes, streams or ponds. Do not appl where runoff is likely to occur. Do no apply when weather conditions favor drift from areas treated. Do not contaminate water by cleaning of equipment, or disposal of wastes. Apl this product only as specified on this label.

Container disposal: Perforate empty metal container. Crush and bury in an isolated area. Never re-use!

Seller makes no warranty, expressed or implied, concerning the use of the product other than indicated on the label. Buyer assumes all risk of u and handling of this material when such use and handling is contrary to label instructions.

U.S. PATENT NO. 2,767,194

PROLATE REG. TRADEMARK STAUFFER CHEMICAL CO.

EPA Est. 2724-TX-1

SERIAL NO. _____

Distributed by STARBAR
12200 DENTON DRIVE, DALLAS TEXAS 75234

MADE IN U.S.A.

PL-03549-E

Note to physician & veterinarian: GX-118 is an organophosphorous insecticide. Atropine is antidotal. Usual symptoms of organophosphorous poisoning in man include: headache, blurred vision, weakness, nausea, discomfort in the chest, vomiting, abdominal cramps, diarrhea, salivation, sweating, pinpoint pupils. Usual symptoms of organophosphorous poisoning in animals include salivation and labored breathing.

Directions for use:

[illegible]

Methods of application

To control:	Method to use:
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Stir the vat thoroughly, preferably with a compressed air device; however, any form of thorough mixing is adequate since GX-118 emulsifies readily.

Restir vat contents prior to each use.

Replenishment: During the dipping operation, each time the vat's volume is reduced by ¼ of its initial volume, replenish the vat as follows:

Replenish vat with water and add GX-118 at a rate of 1 gallon for each 50 gallons water added.

Important: Also add super phosphate at *a rate of 10 pounds per 100 gallons of* additional solution.

Stir well and resume dipping. Repeat replenishment process as necessary. For evaporation add additional water accordingly. For added water due to rainfall, merely replenish vat with GX-118 according to label directions.

Vat should be emptied, cleaned and recharged each time one of the following occurs:

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2. *When the dip becomes too foul for* satisfactory use, within the 60 day limit.
3. If the number of animals dipped equals the number of gallons of the initial bath volume, within the 60 day limit.

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Warnings:

1. GX-118 is a cholinesterase inhibitor. Do not use this product on animals simultaneously or within a few days before or after treatment with or exposure to cholinesterase inhibiting drugs, pesticides or chemicals. Atropine is antidotal. Consult veterinarian at first sign of adverse reaction.
2. Do not apply within 21 days of slaughter.
3. For use on beef cattle only.
4. Do not treat sick, convalescent, or stressed cattle or calves less than 3 months old except in Federal or State eradication programs where immediate treatment of all animals in an infested herd is mandatory. Hand dipping of young animals will prevent swallowing of dip solution.
5. Be sure free access to drinking water is available to cattle prior to dipping. Do not dip excessively thirsty animals. Do not dip animals when overheated.

DRUG LOT NO. _____

[illegible] ACCEPTABLE

EXPIRATION DATE [illegible]

TAKE TIME

6. **Important:** Repeat treatment as necessary but not more often than every 7 days to 10 days. Treatment for lice, ticks and hornflies may be made any time of the year except when cattle grub larvae are in the gullet or spinal canal. Treatment for lice and ticks may be made any time 7-10 days following *treatment for grubs. Do not treat grubs* when the grub larvae are in the gullet or spinal canal.
7. Do not contaminate feed or foodstuffs. This product is toxic to fish. Keep out of lakes, streams or ponds. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from areas treated. Do not contaminate water by cleaning of equipment, or disposal of wastes. Apply this product only as specified on this label.

Container disposal: Perforate empty metal container. Crush and bury in an isolated area. Never re-use!

Seller makes no warranty, expressed or implied, concerning the use of the product other than indicated on the label. Buyer assumes all risk of use and handling of this material when such use and handling is contrary to label instructions.

U.S. PATENT NO. 2,767,194

*PROLATE REG. TRADEMARK STAUFFER CHEMICAL CO.

EPA Est. 2724-TX-1

SERIAL NO. _____

Distributed by STARBAR
12200 DENTON DRIVE, DALLAS TEXAS 75234

MADE IN U.S.A.

PL-03549-E

The Food and Drug Administration have established residue tolerances on most pesticides. Directions should be carefully followed to avoid excessive residue at time of harvest.

Most literature describing the use of lime sulphur will refer to a spray of a given percentage by volume. The following chart indicates the amount of this product necessary to prepare a solution of the strength shown.

MIXING CHART FOR SPRAYING

Water	LACCO LIQUID LIME-SULPHUR 2%	4%	6%	8%
1 Pint	1 tablspn	2 tablspns	3 tablspns	4 tablspns
1 Quart	2 tablspns	4 tablspns	6 tablspns	8 tablspns
1 gallon	8 tablspns	½ pint	¾ pint	1 pint
5 gallons	1¼ pints	2½ pints	3¾ pints	5 pints
10 gallons	2½ pints	5 pints	7½ pints	2½ quarts
100 gallons	2 gallons	4 gallons	6 gallons	8 gallons
200 gallons	4 gallons	8 gallons	12 gallons	16 gallons
300 gallons	6 gallons	12 gallons	18 gallons	24 gallons
400 gallons	8 gallons	16 gallons	24 gallons	32 gallons
500 gallons	10 gallons	20 gallons	30 gallons	40 gallons

NOTICE: Recommendations for the use of this product are based upon information believed to be reliable at time of printing. The use of this product being beyond the control of LOS ANGELES CHEMICAL COMPANY, no guarantee, expressed or implied is made as to the effects of such or the results to be obtained if not used in accordance with directions or established safe and sound practice. THE BUYER must assume all responsibility including injury and/or damage, resulting from its misuse as such or in combination with other products.

USDA Reg. No. 962-007

Lacco

LIQUID LIME-SULPHUR

COMPOSITION

ACTIVE INGREDIENTS:	
*Calcium Polysulphide	29.0%
Calcium Thio-sulphate	2.0%
INERT INGREDIENTS:	69.0%

BAUME' TEST 31° AT 60° F.

Weight per gallon 10.7 pounds

Tox. Cat. Three will be revised to DANGER because of eye Damage hazard.

CAUTION X

KEEP OUT OF REACH OF CHILDREN

KEEP CONTAINER CLOSED **DO NOT LEAVE IN SUNSHINE**

Return or Destroy This Container When Empty

LOT NUMBER CONTENTS GAL.

CTYT8970

MANUFACTURED BY

LOS ANGELES CHEMICAL COMPANY

DIRECTIONS

LACCO LIQUID LIME SULPHUR is prepared for use against certain diseases and pests of crops, livestock and ornamental as listed below. Unless stated dosages are given in terms of gallons per 100 gallons of water and are to be applied as full coverage sprays. Use as directed only when the pests and/or diseases appear.

APPLE: Scab, Mildew. 2 gallons or 2 gallons plus 4 to 5 pounds of LACCO WETTABLE SULPHUR. Apply at green-tip, pink-bud and petal-fall. Do not apply during or prior to periods when temperatures are expected to exceed 90° Fahrenheit.

BUSHBERRIES: Redberry Mite, Boysenberry Mite, Blackberry Leaf Mite, Rose Scale, Oyster Shell Scale, San Jose Scale, 8 gallons. Apply just before the leaf-buds begin to open. If the above application was omitted, apply 5 gallons when the new growth is 1½ inches long. If a second treatment is needed, apply 2½ gallons just before the blossom-buds begin to open.

CHERRY: Brown Mite, Two-Spotted Mite, 1 gallon plus 4 pounds LACCO WETTABLE SULPHUR. Apply post-harvest.

PEACH, NECTARINE: Mildew. ½ to 1 gallon or ½ to 1 gallon plus 5 pounds LACCO WETTABLE SULPHUR. Apply at petal-fall, two weeks after petal-fall and at the beginning of pit-hardening. Mildew, Rust, Peach Silver Mite, 1 gallon or ½ gallon plus 5 pounds LACCO WETTABLE SULPHUR. Apply after pit-hardening. Brown Rot of Cling varieties in the Sacramento Valley of California only, 2 gallons or 2 gallons plus 5 pounds LACCO WETTABLE SULPHUR. Apply if rain occurs within the last 3 weeks prior to harvest. Do not apply before rain. Climatic conditions in certain areas may induce severe phytotoxic effects.

PEAR: (All Varieties California only) Scab. 2 to 3 gallons or 2 gallons plus 4 pounds LACCO WETTABLE SULPHUR. Apply at green-tip. On Bartlett variety, repeat at cluster-bud. If rain is forecast, apply immediately. Pear Leaf Blister Mite, 5 gallons plus 2 gallons LACCO LIGHT MEDIUM EMULSION. Apply post-harvest in late September or October.

BEEF CATTLE, DAIRY CATTLE: Mange (Sarcoptic Mites), Scab (Psoroptic Mites, Chorioptic Mites). 6-2/3 gallons per 100 gallons of water at 95° to 105° Fahrenheit. Apply as a vat dip for 2 to 3 minutes at intervals of 10 to 14 days.

SHEEP: Scab (Psoroptic Mites, Chorioptic Mites). 6-2/3 gallons per 100 gallons of water at 95° to 105° Fahrenheit. Apply as a vat dip for 2 to 3 minutes at intervals of 10 to 14 days.

ROSES: Black Spot, Anthracnose, Brown Canker. 6-2/3 gallons. Apply as the leaves begin to emerge. Stem Canker. 11 gallons. Apply in the fall and again in the spring as the buds begin to open.

962-50115-54

MIXING CHART FOR SPRAYING

on

OPPOSITE PANEL

Lime-Sulfur Solution

Chevron ORTHO

EPA Est. 239-CA-1 № 002869 UA

(FUNGICIDE-INSECTICIDE-MITICIDE)

Active Ingredient	By Wt.
Calcium Polysulfide	29%
Inert Ingredients	71%

Density — Baume at 60° F. .....31°
Contains calcium and sulfur expressed as gypsum—3.0 lbs. per gal. Other combined sulfur 1.9 lbs. per gal.
Product Weight 10.59 lbs. per gal. at 68° F.

DANGER: KEEP OUT OF REACH OF CHILDREN.

READ ENTIRE LABEL. USE STRICTLY IN ACCORDANCE WITH DANGER STATEMENTS AND DIRECTIONS, AND WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

KEEP PESTICIDE IN ORIGINAL CONTAINER. DO NOT PUT CONCENTRATE OR DILUTE INTO FOOD OR DRINK CONTAINERS.

KEEP THIS DRUM IN THE SHADE

WHEN DRUM IS EMPTY, REPLACE BUNGS SECURELY AND RETURN TO MANUFACTURER.

UNLESS OTHERWISE SPECIFIED — USE INDICATED AMOUNT ORTHO LIME-SULFUR SOLUTION TO MAKE 100 GALLONS DILUTED SPRAY.

DIRECTIONS

APPLES: Scab, Powdery Mildew—Use 4 to 5 gals. ORTHO Lime-Sulfur Solution or 2 gals. ORTHO Lime-Sulfur Solution plus 4 to 5 lbs. of FLOTOX Wettable Sulfur. Apply at green tip stage.

CITRUS: Red Spiders—2 gals. Apply when the Spiders appear. Thrips—2 gals. Apply as recommended by your State Agricultural Experiment Stations.

GRAPES (Dormant Only): Powdery Mildew, Mealybugs—2 to 5 gals. to 100 gals. water. Apply 200 gals. dilute spray per acre.

HIMALAYA BLACKBERRIES: Red Berry Trouble (Blackberry Mite)—Use 4 gals. Apply when the leaf buds begin to open. Follow in the early summer with FLOTOX Wettable Sulfur or "ORTHOL" Summer Oil Sprays.

PEACHES, NECTARINES: Leaf Curl, Brown Rot—6 gals. Apply in late dormant period just before the buds begin to swell and in early winter after leaf fall. Concentrate Sprayer: Follow recommendations of State Agricultural Experiment Station.

PEARS: Pear Leaf Blister Mite—5 to 7 gals. Apply in dormant season, before buds start to swell. Bud Mite (Pacific Coast States)—5 gals. ORTHO Lime-Sulfur Solution and 2 gals. ORTHOL-K Flowable Light Medium. Apply early in fall (September or October) when mites first enter bud scales. This spray has also controlled Pear Leaf Blister Mite. Scab—5 gals. ORTHO Lime-Sulfur Solution in cracked Bud Stage and 2 to 3 qts. in Cluster Bud Stage. Concentrate Sprayer: Follow recommendations of State Agricultural Experiment Station.

FOR PSOROPTIC AND SARCOPTIC SCAB OF CATTLE.
FOR PSOROPTIC SCAB OF SHEEP.

OFFICIAL REQUIREMENT—This product meets the standards set forth by the United States Department of Agriculture for the official dipping of Cattle and Sheep for Scabies (Psoroptic, Sarcoptic and Chorioptic varieties). We guarantee the contents of this solution to be of the same composition as the sample we submitted to the Department for examination and that when diluted according to the directions printed hereon for the treatment of Scabies (Psoroptic, Sarcoptic and Chorioptic varieties) on Cattle and Sheep will produce solutions of the composition required by the regulations of the Secretary of Agriculture relative to Scabies (Psoroptic, Sarcoptic and Chorioptic varieties) on Cattle and Sheep.

OFFICIAL DIRECTIONS—The bath must contain not less as ascertained: For Scab (Psoroptic and Sarcoptic) on Cattle—1 gal. to 13 gals. of water; for Scab (Psoroptic and Sarcoptic) on Sheep—1 gal. to 17½ gals. of water. Occasionally add to the vat enough extra Lime-Sulfur Solution to offset the amount of steam condensing in the vat or from other natural causes. Clean out vat after first dipping and use fresh dip for the second. For Scabies (Psoroptic, Sarcoptic and Chorioptic varieties) on Cattle and Sheep dip at 10-day intervals when needed.

FOR USE AS A SOIL AMENDMENT

For alkaline soil correction and improvement of water penetration, use 10 gals. per acre of ORTHO Lime-Sulfur Solution in irrigating water on growing plants.
For preplanting treatment, use 20 to 30 gals. per acre of ORTHO Lime-Sulfur Solution in irrigating water.

CAUTION:

Some fruits and other plants are susceptible to injury from sulfur under certain climatic conditions. The user is advised not to use sulfur on any crop unless local use has proved that sulfur does not damage crops in that locality.

CONDITIONS OF SALE: 1. Chevron Chemical Company (Chevron) warrants that this material conforms to the chemical description on the label and is reasonably fit for use as directed hereon. Chevron neither makes, nor authorizes any agent or representative to make, any other warranty of FITNESS or of MERCHANTABILITY, guarantee or representation, express or implied, concerning this material.

2. Critical and unforeseeable factors beyond Chevron's control prevent it from eliminating all risks in connection with the use of chemicals. Such risks include, but are not limited to, damage to plants and crops to which the material is applied, lack of complete control, and damage caused by drift to other plants or crops. Such risks occur even though the product is reasonably fit for the uses stated hereon and even though label directions are followed. Buyer and user acknowledge and assume all risks and liability (except those assumed by Chevron under 1 above) resulting from handling, storage, and use of this material.

NET CONTENTS 30 GALS. LIQUID

Tox. Cat. One

Chevron Chemical Company
Ortho Division/San Francisco CA 94119
Richmond CA 94804

Product 92 Made in U.S.A.
Form 174-U2
EPA Reg. No. 239-143-AA

DANGER: Causes eye damage and skin irritation. Do not get in eyes or on skin. Harmful if swallowed or absorbed through the skin. Avoid breathing vapors or spray mist. Use waterproof gloves and face shield or goggles when handling concentrate. In case of contact, immediately flush eyes or skin with plenty of water. For eyes, get medical attention.
Note to Physicians: Emergency Information - call (415) 233-3737.

Lime-Sulfur Solution

Chevron ORTHO

EPA Est. 239-CA-1 № 002869 UA

(FUNGICIDE-INSECTICIDE-MITICIDE)

Active Ingredient	By Wt.
Calcium Polysulfide	29%
Inert Ingredients	71%

Density — Baume at 60° F. .....31°
Contains calcium and sulfur expressed as gypsum—3.0 lbs. per gal. Other combined sulfur 1.9 lbs. per gal.
Product Weight 10.59 lbs. per gal. at 68° F.

DANGER: KEEP OUT OF REACH OF CHILDREN.

READ ENTIRE LABEL. USE STRICTLY IN ACCORDANCE WITH DANGER STATEMENTS AND DIRECTIONS, AND WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

KEEP PESTICIDE IN ORIGINAL CONTAINER. DO NOT PUT CONCENTRATE OR DILUTE INTO FOOD OR DRINK CONTAINERS.

KEEP THIS DRUM IN THE SHADE

WHEN DRUM IS EMPTY, REPLACE BUNGS SECURELY AND RETURN TO MANUFACTURER.

UNLESS OTHERWISE SPECIFIED — USE INDICATED AMOUNT ORTHO LIME-SULFUR SOLUTION TO MAKE 100 GALLONS DILUTED SPRAY.

DIRECTIONS

APPLES: Scab, Powdery Mildew—Use 4 to 5 gals. ORTHO Lime-Sulfur Solution or 2 gals. ORTHO Lime-Sulfur Solution plus 4 to 5 lbs. of FLOTOX Wettable Sulfur. Apply at green tip stage.

CITRUS: Red Spiders—2 gals. Apply when the Spiders appear. Thrips—2 gals. Apply as recommended by your State Agricultural Experiment Stations.

GRAPES (Dormant Only): Powdery Mildew, Mealybugs—2 to 5 gals. to 100 gals. water. Apply 200 gals. dilute spray per acre.

HIMALAYA BLACKBERRIES: Red Berry Trouble (Blackberry Mite)—Use 4 gals. Apply when the leaf buds begin to open. Follow in the early summer with FLOTOX Wettable Sulfur or "ORTHOL" Summer Oil Sprays.

PEACHES, NECTARINES: Leaf Curl, Brown Rot—6 gals. Apply in late dormant period just before the buds begin to swell and in early winter after leaf fall. Concentrate Sprayer: Follow recommendations of State Agricultural Experiment Station.

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FOR PSOROPTIC AND SARCOPTIC SCAB OF CATTLE.
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Some fruits and other plants are susceptible to injury from sulfur under certain climatic conditions. The user is advised not to use sulfur on any crop unless local use has proved that sulfur does not damage crops in that locality.

CONDITIONS OF SALE: 1. Chevron Chemical Company (Chevron) warrants that this material conforms to the chemical description on the label and is reasonably fit for use as directed hereon. Chevron neither makes, nor authorizes any agent or representative to make, any other warranty of FITNESS or of MERCHANTABILITY, guarantee or representation, express or implied, concerning this material.

2. Critical and unforeseeable factors beyond Chevron's control prevent it from eliminating all risks in connection with the use of chemicals. Such risks include, but are not limited to, damage to plants and crops to which the material is applied, lack of complete control, and damage caused by drift to other plants or crops. Such risks occur even though the product is reasonably fit for the uses stated hereon and even though label directions are followed. **Buyer and user acknowledge and assume all risks and liability (except those assumed by Chevron under 1 above) resulting from handling, storage, and use of this material.**

NET CONTENTS 30 GALS. LIQUID

Chevron Chemical Company
Ortho Division/San Francisco CA 94119
Product 92 Made in U.S.A.
Form 174-U2
EPA Reg. No. 239-143-AA

Tox. Cat. One → X

Richmond CA 94804

DANGER: Causes eye damage and skin irritation. Do not get in eyes or on skin. Harmful if swallowed or absorbed through the skin. Avoid breathing vapors or spray mist. Use waterproof gloves and face shield or goggles when handling concentrate. In case of contact, immediately flush eyes or skin with plenty of water. For eyes, get medical attention.
Note to Physicians: Emergency Information - call (415) 233-3737.

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE
PESTICIDE USE ENFORCEMENT
Guidelines for Interpreting Pesticide Label Statements for Protective Clothing/Equipment, Etc.

SUMMARIZED LABEL STATEMENT	MIXER-LOADER		GROUND APPLI.		FLAGGER		AERIAL APPLI.	
Toxicity Category →	I-II	III	I-II	III**	I-II	III	I-II	III
Precautions necessary to prevent exposure should be taken.	A B C F G H R*	B C F G H	B C G H R*	C H	C H R*	C H	C R*	C
Protective clothing or protective equipment is to be worn or utilized.	A B C F G H R*	B C F G H	B C G H R*	C H R*	C H	C H	C R*	C
Clean clothing is to be worn.	C	C	C	C	C H	C H	C	C
Contact with clothing should be avoided.	A B C	B C	B C	C	C	C	C	C
Contact with shoes should be avoided.	B	B	B	B				
Rubber boots or rubber foot coverings are to be worn.	B	B	B	B				
Skin contact may be harmful, fatal, irritating, damaging or poisonous.	A B C F G H R*	B C F G H	B C G H R*	C H	C H	C H	C	C
Contact with skin should be avoided.	A B C F G H	B C F G H	B C G H	C G* H	C H	C H	C	C
Material is readily absorbed through skin.	A B C F G H	A B C F G H	B C F* G H	C F* G H	C G* H	C G* H		
A cap or hat is to be worn.	H	H	H	H	H	H		
An apron is to be worn.	A	A						
Rubber gloves are to be worn.	G	G	G	G	G*	G*		
Eye contact may be harmful, fatal, irritating, damaging or poisonous.	F	F	F	F*	F	F*		
Eye contact should be avoided.	F	F	F	F*	F	F*		
Material is readily absorbed through the eyes.	F	F	F*	F*	F*	F*		
Goggles or faceshield are to be worn.	F	F	F	F	F*	F*		
Breathing or inhalation of dust or mist or vapor may be harmful, fatal, irritating, damaging or poisonous.	R	R	R*	R*	R*	R*	R*	R*
Inhalation, breathing or nose contact should be avoided.	R	R	R*	R*	R*	R*	R*	R*
A respirator is to be worn.	R	R	R*	R*	R*	R*	R*	R*

Code — Protective Clothing/Equipment Requirement

A - - - - - Apron, liquids only - rubber, synthetic waterproof
B - - - - - Boots, or foot coverings - rubber, synthetic waterproof
C - - - - - Coveralls or clean outer clothing - daily - (required for all employees handling Category I or II pesticides) - rainsuit if being wet with the spray
F - - - - - Faceshield or goggles (use faceshield when handling liquid. Use goggles when handling dust, wettable powder, granule)
G - - - - - Gloves - rubber or synthetic waterproof
H - - - - - Hat - waterproof, washable hard hat or cloth type if laundered daily
R - - - - - Respirator (faceshield is acceptable substitute only when mixing-loading liquid formulations that do not have a vapor or fume hazard). However, if the label (i.e. methyl bromide, sulfotepp) specifies that a canister-type gas mask is needed, a respirator is not adequate
(*) - - When there is a likelihood of exposure to spray mist, dust, or vapors
(**) - Not applicable to (1) concentrate spraying in groves, orchards or vineyards (less than 100 gal/A.) or (2) enclosed greenhouse applications. - For concentrate or greenhouse, use I-II column

MINIMUM REQUIREMENTS FOR CLOSED MIXING AND LOADING SYSTEMS

When handling liquid pesticides through closed mixing and loading systems meeting the Department of Food and Agriculture's criteria, workers shall wear: (1) Coveralls or outer clothing (clean daily); (2) waterproof gloves; and (3) waterproof foot coverings if worker is exposed to wet (pesticide contaminated) ground or pavement, etc. The hazards of any particular mixing/loading situation may indicate the need for additional protective clothing/equipment.

ACR 59-252

EXTRACTS FROM THE CALIFORNIA ADMINISTRATIVE CODE

Title 3 Agriculture
Chapter 4 Plant Industry
Subchapter 1 Chemistry
Group 2 Economic Poison

Article 23. Pesticide Worker Safety

2475. Purpose of Article.

(a) This article specifies work practices for employees who mix, load, apply, store, or otherwise handle pesticides for agricultural uses as defined in Section 11408, through subsection (c), of the Food and Agricultural Code, and for employees who are exposed to residues of these pesticides after application. In general, the work practices and safety requirements stated in this article are designed to reduce risk of exposure and to assure availability of medical services for employees who mix, load, apply or otherwise handle pesticides, and to provide safe working conditions for field and other workers.

(b) It is the express duty of employers to provide a safe workplace for employees and to order employees to follow safe work practices. Employers shall inform employees of pesticide safety hazards and pesticide safety regulations applicable to all activities they may perform. The employer is responsible for ordering that employees handle and use pesticides in accordance with the requirements of law, regulations, and label requirements.

2476. Definitions. The following definitions apply to this article, unless otherwise apparent from the context.

(a) "Carbamates" mean esters of N-methyl carbamic acid which inhibit cholinesterase.

(b) "Closed mixing system" means a procedure for removing a pesticide from its original container, rinsing the emptied container and transferring the pesticide and rinse solution into a closed mixing tank in a manner that prevents the exposure of any person to the pesticide. Rinsing may be omitted when the pesticide is to be used without dilution.

(c) "Closed loading system" means transferring a pesticide from a mixing tank into an applicator tank by a closed system of hoses, pipes, and/or couplings that connect directly or are sufficiently tight to avoid exposure of any person to the pesticide(s).

(d) "Exposure period" means that period of time that the employee is exposed to pesticides while mixing, loading, applying (including flagging), maintaining or cleaning contaminated equipment, or in contact with pesticides or their residues following these activities. The exposure period will continue until the employee cleans equipment, changes clothing, and thoroughly washes. Exposure period does not include time spent mixing liquid pesticides through a closed mixing system or loading liquid pesticides through a closed loading system.

(e) "Employee" means any person hired by the employer or his agent, including a labor contractor.

(f) "Employer" means any person who hires an employee and may include: (1) the farm operator, (2) a labor contractor, (3) a pest control operator, (4) any other independent contractor, or (5) the employer's agent.

(g) "Farm operator" means the person primarily responsible for the control or management of the property.

(h) "Field" means any area upon which one or more crops are grown and includes greenhouses, turf, and similar areas.

(i) "Safety interval" means the period of time that must elapse after a field is treated with a pesticide, and before employees are permitted to enter the field to engage in any activity that will result in substantial and prolonged exposure of skin, eyes, and/or normal wearing apparel to treated plants.

(j) "Medical supervision" means occupational health guidance and necessary associated health care by a physician licensed to practice medicine in California.

(k) "Organophosphates" mean organophosphorus esters which inhibit cholinesterase.

(l) "Pesticide" means any substance or mixture of substances that is a pesticide as defined in the Food and Agricultural Code and includes mixtures and dilutions of pesticides.

(m) "Pesticides in toxicity category one" means pesticide products which are required to prominently display the signal word "DANGER" on the label and may be required to display the signal word "POISON", and to also show the skull and crossbones symbol on the label.

(n) "Pesticides in toxicity category two" means pesticide products which are required to prominently display the signal word "WARNING" on the label.

(o) "Protective clothing" means clothing which is used to protect the human body from contact with pesticides and is separate from or in addition to normal wearing apparel. Protective clothing may include, but is not limited to, coveralls, waterproof boots, waterproof gloves, waterproof hat, and waterproof apron.

2477. Safety of Employed Persons. The following requirements shall be complied with for the safety of persons working with pesticides as mixers, loaders, flaggers, or ground or aerial applicators.

(a) Age. No employer shall permit an employee under 18 years of age to mix or load a pesticide in toxicity category one or two unless closed mixing and loading systems are used.

(b) Instruction, Training, and Supervision.

(1) Each employer shall provide to each employee working with any pesticide adequate instruction and training so that the employee understands the safety procedures required for the pesticides that he will work with, except as provided in (3) below. This instruction and training for the jobs assigned shall be completed within 30 days after the employee is assigned to handle pesticides other than those in toxicity category one. An employee assigned to handle a toxicity category one pesticide shall be given this training before handling such pesticides. This training shall include the safety procedures to be followed, the safety clothing and equipment to be worn, the common symptoms of pesticide poisoning, the dangers of eating, drinking, or smoking while handling pesticides, where to obtain emergency medical treatment, what medical supervision means, and applicable laws and regulations.

(2) At the completion of training, the employer shall record the date and extent of training given to the employee and the job to be assigned. This information shall be verified by the employee's signature or signed initials and be available for examination by the director or commissioner.

(3) Until training is completed, close supervision consisting of personal observation of each employee's work practice by the employer is required at least every hour at night and at least every two hours during the day. Step (1) above may be omitted by an employer if an employee presents written evidence of pertinent prior training, such as an appropriate license, certificate, or a letter from a previous employer documenting previous training and satisfactory job performance and the employee verifies the same by his signature in the employer's records.

(c) Emergency Medical Care.

(1) For all activities involving the use of pesticides, the employer shall make prior arrangements for emergency medical care and he shall post in a prominent place at the work site, or on the application vehicle if there is no appropriate designated work site, the name, address and telephone number of the physician, clinic, or hospital emergency room providing care.

(2) When the employer has reasonable grounds to suspect that an employee has a pesticide illness or when an exposure to a pesticide has occurred that might reasonably be expected to lead to an employee's illness, the employer shall take the employee to a physician immediately.

(d) Medical Supervision. For any employee whose exposure period exceeds 30 hours in any 30-day period where any pesticide in toxicity category one or two containing an organophosphate or a carbamate is being used, the employer shall engage the service of a licensed physician to provide medical supervision. Medical supervision shall include monitoring of the work force by means of red cell and plasma cholinesterase determinations to be made on each employee before any exposure to such pesticides and as often thereafter as recommended by the physician.

(1) The employer shall have written evidence signed by a physician that the physician has agreed to provide medical supervision as required by this section. The employer shall request the physician to provide to the employer all cholinesterase test results and recommendations applicable to this medical supervision. The employer shall keep a record of all recommendations received from the medical supervisor and all cholinesterase test results obtained on his employees. These records and this evidence shall be maintained for three years and shall be available for inspection by the employee, the director, commissioner, county health official, or state health official.

(2) The employer shall follow the recommendations of the medical supervisor concerning matters of occupational health. When, in the physician's opinion, continued exposure to pesticides is likely to injure an employee's health, such employee shall be removed from exposure until the physician authorizes his return. The physician may also limit the exposure period of any employee to pesticides when cholinesterase test results and/or poisoning incidents indicate such limitations are necessary to protect the health of an employee.

(3) The employer shall post the name, address, and telephone number of this physician in a prominent place at the locale where the employee usually starts the workday or in the application vehicle if there is no locale where the employee usually starts the workday.

(4) The State Department of Health shall furnish physicians providing supervision with guidelines for this medical supervision program. The physician guidelines provided by the State Department of Health shall (A) designate appropriate test methods and will list laboratories that will perform cholinesterase determinations according to these methods; (B) require pre-exposure baseline cholinesterase determinations and follow-up tests at appropriate intervals for each employee covered by the first sentence of (d) above; (C) outline the considerations involved in decisions regarding frequency of cholinesterase testing and circumstances under which workers should be removed from exposure; (D) require that both plasma and red cell determinations be performed on all samples tested; (E) require that baseline and follow-up tests be performed by the same laboratory and by the same method whenever practical; and (F) indicate that if an employee's plasma cholinesterase level decreases 50% below his baseline or if his red cell cholinesterase decreases 40% below his baseline, the employer will be instructed to remove the employee from all work exposure to organophosphates and carbamates until the employee's red cell and plasma cholinesterase both return to his pre-exposure baseline range.

(5) A laboratory performing red cell and plasma cholinesterase tests for occupational health surveillance shall be approved by the State Department of Health and shall have a quality control program and an analytical method acceptable to that department.

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(e) Working Alone with Pesticides in Toxicity Category One.

(1) An employee may work alone with a pesticide in toxicity category one during daylight hours only when personal, radio, or telephone contact is made to a responsible adult at intervals not exceeding two hours.

(2) An employee may work alone with a pesticide in toxicity category one during nighttime hours only when personal, radio, or telephone contact is made to a responsible adult at intervals not exceeding one hour.

(3) A pilot, mixer-loader, and/or flagger team shall be considered as working together. In the case of two ground applicators working in the same field, no additional person is necessary if they can see each other's application vehicles.

(f) Change Area. For any employee whose exposure period exceeds 30 hours in any 30-day period with pesticides in toxicity categories one or two employers shall provide at the place where employees complete their workday an area where employees may change clothes and wash themselves. Clean towels, soap, and adequate water shall be available to allow for thorough washing. Employers shall order their employees to change into their work clothing and protective equipment at the start of the day's exposure period, and to remove such clothing and equipment and to wash themselves at the end of each day's exposure period. The employer shall provide a clean, pesticide-free place where employees may store any personal clothing not in use while they are at work handling pesticides. The employer shall order employees not to take home contaminated clothing or equipment.

(g) Personal Washing Facilities at Mixing and Loading Site. Clean water, soap and towel(s) for routine washing of hands and face, and for emergency washing of the entire body shall be available for all employees at the work site where they mix or load pesticides in toxicity categories one or two. A minimum of ten gallons of water shall be present at the beginning of each workday for one employee and a minimum of 20 gallons for two or more employees. This water shall be stored separate from that used for mixing with pesticides unless the tank holding water for mixing with pesticides is equipped with appropriate valves to prevent back flow of pesticides into the water. Any other easily available supply of clean water within 100 feet of the mixing and loading site is satisfactory for the purposes of this section.

(h) Protective Clothing. Each employer shall provide clean outer clothing, such as coveralls, daily for each employee who works as a mixer, loader, flagger, or applicator with any pesticide in toxicity category one or two and shall provide for its cleaning after any day when the employee handles such pesticides. The person or firm doing the laundry shall be informed by the employer if they receive pesticide-contaminated clothing. There shall be at the mixing and loading site at least one change of outer clothing.

(i) Safety Equipment. The employer shall provide all necessary safety equipment and provide for its cleaning when necessary. The employer shall require that any respirator filter pads and cartridges

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be changed in the manner and with the frequency recommended by the manufacturer. The employer shall require that all personal protective equipment be maintained and kept in a clean, specially designated place or locker when not in use. This clothing and equipment shall remain the property of the employer.

(j) Safety Procedures. Based upon the safety procedures specified in the pesticide labeling, the employer shall advise the employee of the protective clothing and equipment he is to use and the safety procedures he is to follow according to the label requirements and hazards of the job or jobs he will perform. The employer shall order that these provisions are followed.

(k) Adequate Light at Mixing and Loading Site. Whenever natural light in mixing/loading area is not adequate to allow an employee to read the label and work in a safe manner, artificial light shall be provided in such areas which is sufficient to perform these activities.

2478. Safe Equipment.

(a) Equipment Inspection. Equipment used for mixing, loading, or applying pesticides shall be kept in good repair and shall be safe to operate. The director or commissioner may inspect at any reasonable time equipment used in mixing, loading, and application of pesticides. Equipment with any safety defect shall be repaired or altered to remove the hazard before further use.

(b) Equipment Maintenance. Persons who own or operate pesticide mixing, loading, or application equipment shall inform each employee under their control who may be involved in the cleaning, servicing or repair of that equipment of the hazards of the pesticides that person may encounter and the methods of protecting against personal injury. If such cleaning, servicing or repairing is to be performed by persons not under the control of the owner or operator of the equipment, he shall so notify the person in charge of performing these services. Employees who clean, service, or repair mixing and application equipment shall be provided with any necessary protective equipment or clothing by their employer, and shall be instructed and supervised in the maintenance operation in a manner that will reduce work hazards.

(c) Equipment Specifications.

(1) All hatches or doors on aerial, or ground applicator vehicle tanks shall be equipped with a cover that will prevent spillage when the vehicle is in motion.

(2) Flexible hoses carrying liquid pesticides in toxicity categories one or two under pressure shall not pass unshielded through the cockpit of an airplane or helicopter.

(3) Shut-off devices shall be installed on the exit end of all hoses carrying liquid pesticides in toxicity categories one or two from mixing tanks that are adequate to prevent splashes on to the employee doing the loading when filling operations are stopped

and the filler hose is removed from the inlet to the tank of the application vehicle. As an alternative, a reversing action pump or a similar system may be used that will empty the hose and will eliminate dripping of liquid from the end of the hose when the filling operation is stopped.

(4) Each tank with a capacity of more than 49 gallons that is used to mix or apply any liquid mixture derived from a pesticide in toxicity categories one or two, shall have either, (1) a properly functioning means to indicate externally the internal liquid level in the tank such as a sight gauge; or (2) the tank or the filler hose nozzle shall have a device that will automatically stop the filling operation before the pesticide liquid mixture spills over the top.

(d) Closed Mixing Systems. Hand pouring by employees of all liquid pesticides in toxicity category one shall be eliminated by the use of closed mixing systems in accordance with the following schedule:

(1) Employees of agricultural pest control operators shall not hand pour such pesticides after April 1, 1977.

(2) Employees of private applicators (growers) and others not included in (1) shall not hand pour such pesticides after July 1, 1977.

(3) The date specified in (1) and (2) may be extended if the employer can display written evidence that a sufficient number of closed mixing systems meeting the director's criteria have been ordered or that a sufficient number of closed mixing systems capable of meeting such criteria are being built for or by the employer. Such written evidence that systems have been ordered shall include the manufacturer, model identification, number of units ordered, and proposed delivery date. Evidence that systems are being built for or by the employer shall include the number of units and proposed date of completion.

Employers shall exhibit good faith in obtaining closed mixing systems and putting them into operation.

In no case shall hand pouring of liquid toxicity category one pesticides be allowed after December 31, 1977.

(4) For each employee who mixes or loads liquid pesticides in toxicity category one or two containing an organophosphate or carbamate only through closed systems on five or more days in any consecutive 30 day period, the employer shall engage the services of a licensed physician to provide each employee with a pre-exposure baseline cholinesterase determination.

After the first year, one annual cholinesterase determination shall be sufficient if the plasma and red blood cell values are each within 20% of the original baseline values.

The manner of conducting cholinesterase determination shall be in accordance with guidelines provided by the State Department of Health under Section 2477(d)(4) and records of these tests shall be maintained and made available as specified in Section 2477(d)(1).

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(5) The requirements of this subsection (d) do not apply to the employees of research units who are developing and testing new pesticides or new uses of pesticides, if they hand pour one gallon or less of such pesticides per day.

2479. Field Worker Safety. Employers shall comply with the following for the safety of employees who may enter areas when exposure to pesticides or their residues may reasonably be expected.

(a) Personal Safety.

(1) Emergency medical care shall be planned for in advance. The employees or their supervisor in the field shall be informed of the name and location of the physician or medical facility who will provide emergency medical care. If an employer expects to have five or more employees working in such areas on any one day, during a year, a growing season or a harvest season, in advance of that date, the employer shall notify such a facility of the possible need for medical care. The employer shall request and obtain a written statement from such a facility that such care will be provided, if requested, and shall present such a statement for examination when requested by the Director.

(2) Handwashing facilities shall be available. Handwashing facilities provided in conjunction with toilet facilities which are required by the provisions of Section 5474.26 et seq. of the Health and Safety Code shall be considered adequate for the purposes of this section.

(3) Field work supervisors shall be informed of the usual symptoms of organophosphate and carbamate poisoning.

(4) When pesticide poisoning is suspected in an employee, the employer or his designated agent shall take the employee to a physician immediately.

(b) Field Work During Pesticide Application.

No person shall apply any pesticide in such manner that it contaminates the body or clothing of any employee during the application process, except for employees who are involved in the application process and who are wearing the appropriate protective clothing and/or equipment.

(c) Field Reentry After Pesticide Application.

(1) Employees shall not be permitted to enter any area of a field treated with any pesticide until the pesticide spray has dried or the pesticide dust has settled unless that employee wears the same protective clothing and equipment specified for the applicator in the labeling of that pesticide. In no case does the waiting period for the drying or settling to occur need to exceed 24 hours.

(2) After the Pesticide Spray has Dried or the Pesticide Dust has Settled.

(A) A field may be entered by employees without restriction after the pesticide has dried or the pesticide dust has settled, except (1) when the labeling of the pesticide specifies a longer safety interval or (2) a safety interval is specified in this section. In case of a conflict between the pesticide labeling and that specified in this section, the longer interval shall be followed.

(B) Employers shall not permit employees to enter any part of such treated field to engage in any activity that may involve substantial and prolonged body contact with the treated plants during a safety interval unless medical supervision, change area, and protective clothing similar to that specified in Section 2477 has been provided by the employer for each employee.

(C) Whenever a mixture of two or more organophosphate pesticides having a safety interval is applied, the safety interval shall be prolonged by adding to the longest applicable safety interval either (1) 50 percent of the next shortest applicable safety interval, or (2) 4 days, whichever is the longest.

(D) Safety Intervals in Days.

	Citrus	Peaches & Nectarines	Grapes	Apples
Azinphosmethyl (Guthion)	30	14	21	14
Carbophenothion (Trithion)	14	14	14	-
Demeton (Systox)	5	7	7	-
Diazinon	5	5	5	-
Dimecron (Phosphamidon)	14	-	-	-
Dimethoate (Cygon)	4	-	4	-
Dioxathion (Delnav)	30	30	30	-
EPN	14	14	14	14
Ethion	30	14	14	-
Malathion	1	1	1	-
Methomyl (Lannate, Nudrin)	2	2	2	-
Mevinphos (Phosdrin)	4	4	4	-
Naled (Dibrom)	1	1	1	-
Parathion-ethyl	30(a) 45(b)	21	21	14
Parathion-methyl	-	21	6(c)	14
Phosalone (Zolone)	21	21	21	-
Imidan	-	5	5	-
Sulfur	1	1	1	-
TEPP	4	4	-	-
Torak	-	-	45	-
Supracide	30	-	-	-

Footnotes:

(a) Less than 8 pounds of actual parathion per acre, per application but no more than 10 pounds per acre, in the past 12 months.

(b) More than 8 pounds of actual parathion per acre per application or more than 10 pounds per acre in the past 12 months.

(c) If encapsulated methyl parathion is used the safety interval shall be 12 days.

(E) In addition to the crops listed in (D) above, when more than one pound per acre of actual parathion, methyl parathion or EPN is applied singly or in combination to any crop, a 14-day safety interval applies.

(F) When methomyl is used on corn the safety interval shall be 2 days.

(G) When there is no foliage on the crop that has been treated by a pesticide, the safety interval shall be reduced by 50 percent, but in no case shall it be less than 24 hours.

(H) Persons determined by the director or commissioner to have only limited and intermittent exposure to treated plants such as licensed pest control advisers, as well as federal, state, and county employees who need to enter treated areas during safety intervals or are exposed to toxicity category one or two organophosphate or carbamate pesticides in the course of their duties shall be exempt from the provisions of Section 2477 and this Section except that the employer shall require plasma and red cell cholinesterase baseline determinations to be established.

(d) If a field is suspected as having been a source of a pesticide-related illness or of having a high probability of producing a pesticide-related illness, the director or commissioner may prohibit entry of employees to that field or he may require the employer to provide medical supervision to employees who will enter the field to engage in substantial and prolonged body contact with the plants. The director or commissioner may also specify types of protective clothing and equipment to be worn by employees under such circumstances.

2480. Warnings.

(a) Employees who might reasonably be anticipated to enter an area being treated or which has been treated with a pesticide for which the safety interval has not expired shall be orally warned by the employer. Oral warnings shall be given in English. When employees do not understand English such oral warning shall be in a language understood by such employees.

(b) When azinphosmethyl (Guthion), demeton (Systox), dimecron (Phosphamidon), carbophenothion (Trithion), EPN, ethion, Torak, phosalone (Zolone), parathion, and/or methyl parathion have been applied and the

application results in a safety interval greater than four days, the posting of warning signs is also required.

(1) The farm operator, or his agent shall post warning signs at the usual point or points of entry and in addition in a manner prescribed by the commissioner. When treated fields requiring posting are adjacent to a public right-of-way and are unfenced, warning signs shall be posted at each corner and at intervals not exceeding 600 feet in addition to the normal points of entry.

(2) Posted warning signs shall be of such durability and construction that they will remain clearly legible for the duration of the safety interval, will be of such size so that the word "DANGER" is readable and two skull and crossbone symbols are clearly evident at a distance of 25 feet, and will read in the English and Spanish languages substantially as follows:

D A N G E R	-	P E L I G R O
Place skull and crossbone symbol here.		Place skull and crossbone symbol here.
(Name of Pesticide)	-	PESTICIDA (VENENO)
DO NOT ENTER	-	NO ENTRE
UNTIL	-	HASTA

(Date)

(Grower's name) (Field identification, if any)

The use of a third language on the sign is permissible.

(3) These signs shall not be posted unless a pesticide application has been made or is scheduled within the next 24 hours.

(4) These signs shall not be removed during the safety interval.

(5) Warning signs shall be removed by the farm operator or his agent within 5 days after the end of the safety interval and before employees are allowed to enter to engage in an activity requiring substantial contact with treated plants.

2481. Records.

(a) A record of each pesticide application involving the crops and pesticides for which there are safety intervals shall be maintained by the farm operator for at least one year from the time of application, and shall be readily available for inspection and copying by the director or commissioner. These records shall contain the following information as to each application, as applicable:

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(1) Crop.
(2) Acres or other unit.
(3) Pesticide(s) used.
(4) Dosage, dilution rate, and volume per acre.
(5) Location.
(6) Date application completed (including the hour completed, if the safety interval is 2 days or less).

(b) A copy of the Department of Food and Agriculture Pesticide Use Report, properly completed, shall serve as an adequate record.

2482. Studies on Pesticide Safety.

(a) No person shall conduct any study to establish a safety interval if human subjects are to be exposed, unless the director has approved such study. Each applicant shall give assurance (1) that the health of participants is not likely to be endangered, (2) that participants shall be informed of the potential risks, and (3) that all persons that might be exposed will be under medical supervision. Any university or medical institution in California which has current approval by the U. S. Department of Health, Education and Welfare to conduct studies on human beings shall be considered to have complied with the above.

(b) The director shall deny approval for studies which do not meet these criteria. He may consult the State Department of Health for advice when he determines this to be necessary.

(c) The State Department of Health shall provide the director with guidelines for assistance in protecting the health of persons who may be exposed during such studies.

(d) The commissioner or director may order employee exposure in such studies to cease immediately and the director may summarily cancel such approval whenever it is deemed advisable in the interest of employee safety, or public safety.

2483. Inspection Authority. The director or commissioner shall have authority to enter and inspect at reasonable times, without prior notification, premises where pesticides are stored, mixed, and/or are loaded for application and the fields, structures, areas, and greenhouses where pesticides are being applied, have been applied, or are presumed to have been applied, in order to determine compliance with the provisions of this article. The director or commissioner shall be permitted to examine records concerning pesticide usage, work hours of employees and medical supervision.

2484. Employer-Employee Responsibilities. Each employer and each employee shall comply with each regulation in this article which is applicable to his own action and conduct.

2485. Rodenticides, Predacides, Avicides and Disinfectants. For pesticides that are used only as rodenticides, avicides, predacides, or disinfectants, only sections 2475, 2476, 2477(a),(b),(c),(g),(i), and (j), 2478(a) and (b), 2479 (a) 3 and 4, 2483, and 2484 of this article shall apply.

2486. Public Agencies. Subject to the right of the director to revoke this exemption, public agencies or their contractors operating under cooperative agreements with the State Department of Health and applying pesticides approved for this use by that Department and in amounts approved by that Department are not restricted by sections 2479, 2480, and 2481 of this article. Should the director require compliance with these sections, the public agencies shall comply forthwith.

2487. Application of Labor Code. In order to insure that rights granted to California employees by Chapter 1 of Division 5 of the California Labor Code are adequately provided to agricultural employees, including employee rights (1) to file confidential complaints alledging unsafe work conditions, (2) to have complaints promptly investigated, (3) to talk to inspectors or compliance officers, and to point out hazards during the inspection process, (4) to be notified of any relevant job hazard, and (5) to not be subject to any retaliation or discrimination because such employee has filed any complaint regarding an unsafe work condition, the director, commissioners, and the Department of Industrial Relations shall cooperate in fully implementing any master agreements entered into between these parties which are designed to insure enforcement of employees' rights as well as any inspection protocols adopted pursuant to such master agreements.